Research Skills Development at AFAR

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Purposes

1. To develop skills used in the field of neuroendocrinology
2. To develop a workable hypothesis and research project for my 4th year Honor's Thesis

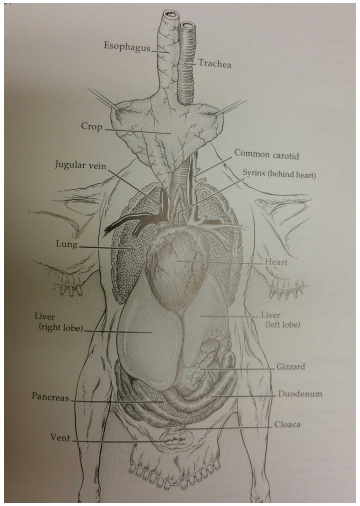
Developed Skills

Cryostat

- Brains were sectioned at 40 µm per slice
- Kept in -20°C chamber

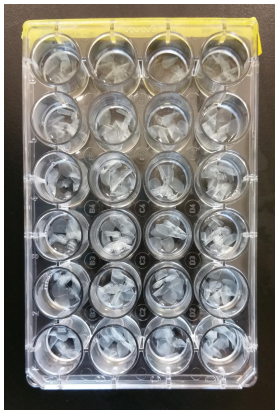
Dissections

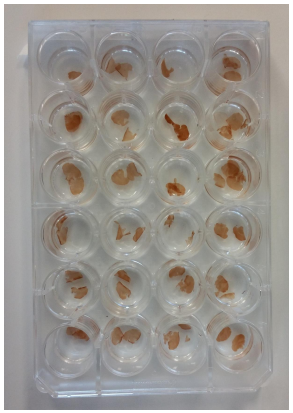
- Heart, liver, lungs, and kidneys were dissected from the same song sparrows



Immunohistochemistry & Mounting

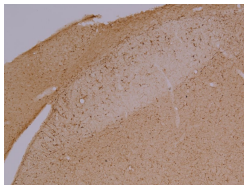
- Widely used cell-labelling method involving
  - Blocking of normal enzymatic cell function,
  - Primary labeling of proteins using specific antibodies
  - Secondary labelling for better visualization
  - Catalyzing a reaction on the receptor complex to visualize the proteins
- After IHC, newly labeled slices were mounted from wells onto microscope slides

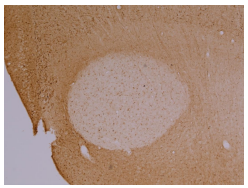




Microscopy

- Basic light microscope was used to take pictures of song-control areas in brain slices that were mounted earlier





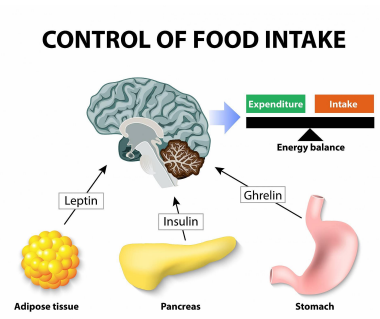
Catching Birds

- Being able to catch birds is going to be important when it comes time to catch our own for the thesis

https://ebird.org/species/sonspa

Thesis Project Fall/Winter 2021-22

- In 2018, Henderson et al. tested whether **hormones that regulate energy balance and eating also regulate food storing behaviour**
- They found that injection with leptin and a high-dose of ghrelin caused birds **to hoard fewer food items, and reduced their mass gain**, compared to saline-injected birds
- Interestingly, birds injected with a low dose of ghrelin showed no significant change in food hoarding



shutterstock_311817806-socialmedia-4870.jpg (1920×1615) (emetabolic.com)

https://www.audubon.org/news/birdist-rule-71-figure-out-what-kind-chickadees-youve-got

- It is the first study to look at the effects of these hormones on food hoarding behaviour; as such, I have chosen to replicate this study with some variations to their methods. We will:
  - Inject birds with acylated and unacylated ghrelin
  - Use chicken ghrelin, rather than mouse ghrelin
  - Use black-capped chickadees, rather than coal tits

Moving Forward

- All of these skills are commonly used in research labs, and this internship has provided a base skillset upon which I can develop new skills working in a lab
- While learning these methods, I have also learned new ways of organizing, and keeping track of data
- I will continue to work with other students in the lab on their research projects to further develop these skills, while conducting my own research for my thesis

Works Cited

Henderson L.J., Cockcroft R.C., Kaiya H., Boswell T., Smulders T.V. (2018). Peripherally injected ghrelin and leptin reduce food hoarding and mass gain in the coal tit (Periparus ater). *Proc. R. Soc. B* 285: 20180417. http://dx.doi.org/10.1098/rspb.2018.0417

Proctor, N. S., & Lynch, P. J. (1993). Thoracic and Abdominal Organs Rock Dove (*Columba livia*) [Illustration]. In *Manual of ornithology: Avian structure & function*. New Haven: Yale University Press.